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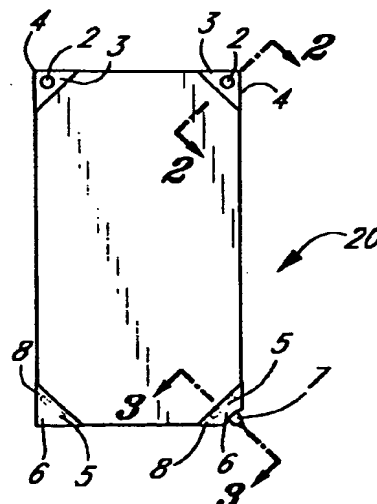
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(54) **Bedding structure equipped with acoustic mechanism**

(57) An underlay bedding (20) comprises a cushioning material (1), a cover (9) surrounding the cushioning material, one or more stereo speakers (2) near the corners (4) of the head region of the cushioning material, and one or more oscillators (5) near the corners (6) of the foot region of the cushioning material. The speakers (2) are provided within plastic cases (3,8) attached to the corners of the cushioning material or, alternatively, positioned within recesses in the cushioning material. The oscillators (5) are embedded within the cushioning material (1) or, alternatively, positioned within recesses (10) in the cushioning material. Sockets (7) are provided at the foot region of the cushioning material and are electrically connected to the speakers and oscillators. A program source on a microcomputer provides a signal to the speakers and oscillators. The oscillators (5) are maintained at a preset oscillation in response to the frequency of the speakers. The present invention thus provides a bedding underlay that includes an acoustic mechanism for the provision of music and additional vibration to a sleeping person's body, to enhance relaxation during sleep.



**FIG. 1**

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## Description

### Background of the Invention

[0001] The present invention relates generally to bedding structures such as quilts or mattresses and, in particular, to bedding underlays including acoustic mechanisms.

[0002] In the social and working environment, human beings are subjected to various forms of stress. It is commonly believed that the most effective method to relieve such stress is relaxation brought about by sound sleep. For this reason, methods have been developed to enhance relaxation during sleep.

[0003] One such method involves a warming effect, or ion effect, caused by infrared rays acting upon ceramic elements attached to or inserted into bedding materials such as mattresses or quilts. The effect is one of a natural warming of the sleeping person's body during sleep. Also, the body is subjected to minute levels of electricity, producing a relaxing effect.

[0004] Music is another recognized means for stress relief. For example, prior art beds have included speakers in the headboard.

[0005] Despite advances in techniques and devices for enhancing relaxation during sleep, a need exists for improvements in this field.

### Summary of the Invention

[0006] Accordingly, it is a principle object and advantage of the present invention to provide an improved bedding underlay including an acoustic mechanism.

[0007] One aspect of the present invention provides a bedding structure comprising a bedding underlay and one or more speakers. The bedding underlay comprises cushioning material having a first end and a second end. At least one of the speakers is at least partially embedded within the bedding underlay.

[0008] Another aspect of the present invention provides a bedding underlay comprising a cushioning material having a first end and a second end, one or more speakers attached to the cushioning material, and one or more oscillators attached to the cushioning material.

[0009] Yet another aspect of the present invention provides a bedding underlay comprising a cushioning material having a top surface and a bottom surface, one or more speakers secured to the cushioning material and positioned between the top and bottom surfaces, one or more oscillators secured to the cushioning material and positioned between the top and bottom surfaces, and a cover surrounding the cushioning material.

[0010] All of these embodiments are intended to be within the scope of the invention herein disclosed. These and other embodiments of the present invention will become readily apparent to those skilled in the art from the following detailed description of the preferred

embodiments having reference to the attached figures, the invention not being limited to any particular preferred embodiment(s) disclosed.

### Brief Description of the Drawings

[0011]

Fig. 1 is a schematic top plan view of one embodiment of a bedding underlay, constructed in accordance with a preferred embodiment of the present invention;

Fig. 2 is a cross-sectional view taken along lines 2-2 of Fig. 1;

Fig. 3 is a cross-sectional view taken along lines 3-3 of Fig. 1;

Fig. 4 is a top view of a second embodiment of a mattress having features in accordance with the teachings of the present invention;

Fig. 5 is a cross-sectional view taken along lines 5-5 of Fig. 4;

Fig. 6 is a cross-sectional view taken along lines 6-6 of Fig. 4;

Fig. 7 is a top view of a third embodiment of a mattress having features in accordance with the teachings of the present invention;

Fig. 8 is a cross-sectional view taken along lines 8-8 of Fig. 7;

Fig. 9 is a cross-sectional view taken along lines 9-9 of Fig. 7; and

Fig. 10 is a cross-sectional view of the speaker section of a fourth embodiment of a mattress having features in accordance with the teachings of the present invention.

### Detailed Description of the Preferred Embodiment

[0012] Music has a vibratory effect that relaxes the human body. This relaxation effect is enhanced by the application of additional vibration to the body, especially the foot region. Such additional vibration can be combined and harmonized with the music to provide superior relaxation during sleep.

[0013] It is known in the prior art to include speakers in the headboard of the bed. Unfortunately, a limitation of such devices is that the speakers do not impart a substantial vibratory effect on the bedding structure and the sleeping person's body. Moreover, the vibrations imparted to the bed are significantly dampened before affecting the body, providing reduced relaxation. Thus, there is a need for a structure that enhances the relaxation effect that music causes on the human body during sleep, and that further provides additional vibration to the sleeping person's body, especially the foot region.

[0014] Fig. 1 shows a mattress or bedding underlay according to one embodiment of the present invention, comprising cushioning or insulating material 1 having upper corners 4 and lower corners 6. The upper corners

4 are preferably oriented toward the head region of a bed, and the lower corners 6 are oriented toward the foot of the bed. The cushioning material 1 is preferably formed from a soft foam, such as urethane foam, having an approximate thickness of 100 mm. Stereo speakers 2 are provided within supporting cases 3 fitted at the upper corners 4 of the cushioning material 1. Oscillators 5 are provided near the lower corners 6 within the cushioning material 1, and communicate with a socket 7 within supporting cases 8. The cases 3, 8 preferably comprise a rigid, structural plastic for protection of the housed components.

[0015] Fig. 2 illustrates in greater detail the configuration of the upper corners 4 of the bedding underlay 20. As shown, the cushioning material is partially inserted into, and attached to, the supporting cases 3, so that regions 22 inside of cases 3 remain unoccupied by the material 1. Desirably, the material 1 is chamfered at the corners to create room for the speakers 2 and surrounding regions 22 when inserted into the cases 3, without extending beyond the generally rectangular boundaries of the underlay 20. As shown, the speakers 2 are vertically positioned between the top and bottom surfaces of the cushioning material 1.

[0016] At least one stereo speaker 2 is provided within the region 22, and is shown attached to the inside surface of the top portion of case 3 in the illustrated embodiment. Any suitable attachment means is utilized to attach the speaker 2 to the case 3, such as adhesion bonding, nut and bolt combinations, rivets, screws, or stitching. The speakers 2 provide music to the head region of mattress 20. Although only one speaker 2 is shown in each corner 4, those of skill in the art will understand that an array of speakers 2 could be provided within the bedding underlay 20, preferably on each side of the head region, without departing from the spirit and scope of the invention.

[0017] Fig. 3 illustrates the configuration of the lower corners 6 of the bedding underlay 20, preferably oriented towards the foot region. As shown, the material 1 is inserted into, and attached to, the supporting case 8. Oscillators 5 are preferably embedded or partially embedded in the material 1. Alternatively, the oscillators 5 could simply be attached onto the side of material 1. The oscillators 5 produce vibrations in the foot region of bedding 20, enhancing the relaxation of the sleeping person's body. Although only one oscillator 5 is shown in each corner 6, those of skill in the art will understand that an array of oscillators 5 can be provided within the bedding 1 without departing from the spirit and scope of the invention. As shown, the oscillators 5 are vertically positioned between the top and bottom surfaces of the cushioning material 1.

[0018] As shown in Figs. 1 and 3, the socket 7 is provided within the case 8 as a means for providing power to the speakers 2 and oscillators 5. Electrical connections (not shown) are provided between the socket 7 and the speakers 2, as well as between the socket 7

and oscillators 5.

[0019] Electrical signals are provided to the speakers 2 from any suitable source, such as a radio, CD player, etc., desirably including an amplifier with a flat response curve across the audible spectrum. Signals to the oscillators 5 can be independent, but preferably are linked via a low-pass amplifier. Thus, the oscillators 5 are maintained at a preset oscillation in response to the frequency of the speakers 2. As a result, the user can adjust the program source to select a desired music, volume, etc., as well as a complementary level of vibration to the foot region.

[0020] In the illustrated embodiment, a bedding cover 9 surrounds the cushioning material 1 and the cases 3 and 8. The speakers 2 and signal source are thus preferably connected by wires running under the cover 9. Alternatively, radio waves can control the speakers 2. In such an arrangement, the radio waves advantageously perform the additional function of producing the above-described warming effect. This effect can be produced by inserting ceramic elements into the bedding 20 and/or overlying quilts, etc. As the radio waves send signals to the speakers 2, the ceramic elements are simultaneously warmed, thus further enhancing the relaxation of the sleeping person.

[0021] Figs. 4-6 illustrate another embodiment of the invention wherein like parts will be referenced by like reference numerals. In this embodiment, the speakers 2 and oscillators 5 are partially embedded within the cushioning material 1. In particular, the speakers 2 and oscillators 5 are provided within open cavities or recesses 10 in the cushioning material 1, proximate the upper corners 4 and lower corners 6, respectively. The speakers 2 and oscillators 5 are attached to and suspended by supporting plates 11 and 12, respectively, which are fixed above the recesses 10. As in the previous embodiment, the bedding cover 9 preferably surrounds the entire cushioning material 1, the plates 11 and 12, and the attached speakers 2 and oscillators 5. The socket 7 is embedded within the side of the cushioning material 1, as shown.

[0022] Figs. 7-9 illustrate still another embodiment of the invention. In this embodiment, the speakers 2 and oscillators 5 are provided within open cavities or recesses 10 in the cushioning material 1, proximate the upper corners 4 and lower corners 6, respectively. The speakers 2 and oscillators 5 are suspended by the supporting plates 11 and 12, respectively, which rest above the recesses 10. In the illustrated embodiment, the plates 11 and 12 are attached to the cover 9 by suitable means (such as the illustrated adhesive tape 13), so that the cover 9, plates 11 and 12, speakers 2, and oscillators 5 can be removed together.

[0023] Fig. 10 illustrates yet another embodiment of the invention. In this embodiment, the speakers 2 are provided within enclosed cavities or recesses 14 near the upper corners 4. In the illustrated embodiment, the enclosed cavities 14 are formed in the side of the mate-

rial 1, which is enclosed by a plug 15. The speakers 2 are positioned within porous speaker cases 16. The plug 15 preferably comprises a relatively hard material, such as semi-hard urethane foam. In operation, sound from the speakers 2 passes through the pores or perforations in the speaker cases 16 and through the material 1 and plug 15, serving to soften and slightly mute the sound quality.

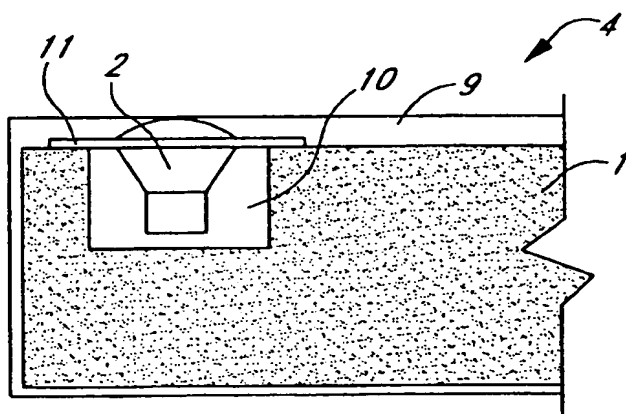
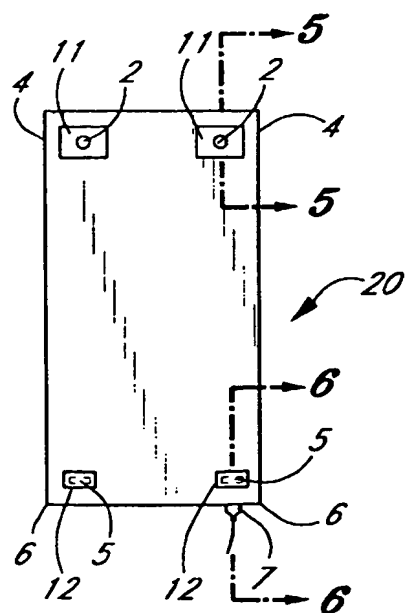
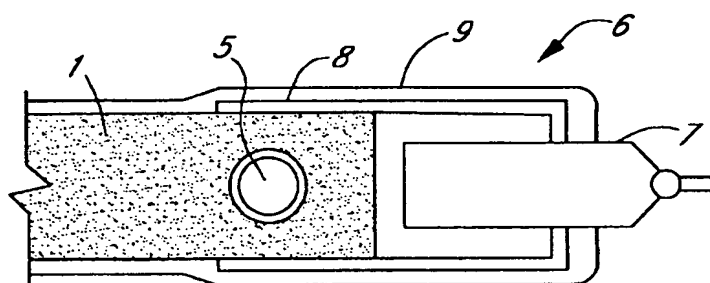
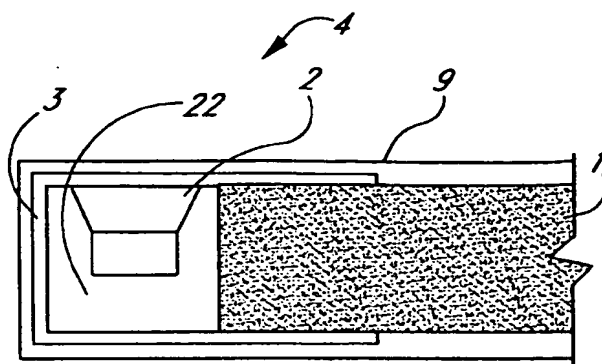
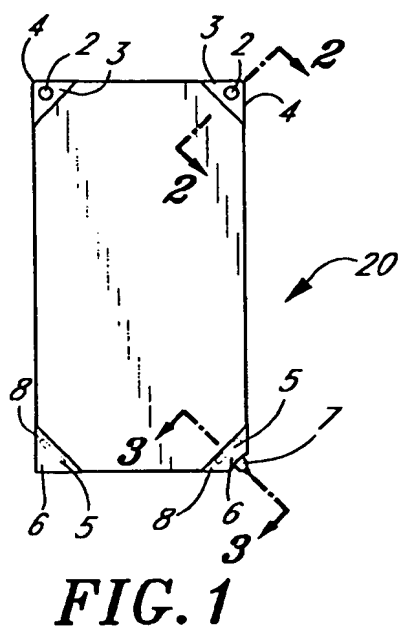
**[0024]** Although this invention has been disclosed in the context of certain preferred embodiments and examples, it will be understood by those skilled in the art that the present invention extends beyond the specifically disclosed embodiments to other alternative embodiments and/or uses of the invention and obvious modifications and equivalents thereof. Thus, it is intended that the scope of the present invention herein disclosed should not be limited by the particular disclosed embodiments described above, but should be determined only by a fair reading of the claims that follow.

### Claims

1. A bedding structure comprising:
  - a bedding underlay comprising cushioning material having a first end and a second end; and
  - one or more speakers, at least one of said speakers being at least partially embedded within said bedding underlay.
2. The bedding structure of Claim 1, further comprising one or more oscillators at least partially embedded within said cushioning material.
3. The bedding structure of Claim 2, wherein said oscillators are embedded within each of two opposing sides of said second end.
4. The bedding structure of Claim 1, wherein said bedding underlay further comprises cases secured onto corners of said first end of said cushioning material so that a region within each of said cases remains unoccupied by said cushioning material, wherein at least one of said speakers is within at least one of said regions.
5. The bedding structure of Claim 1, wherein said speakers are positioned on each of two opposing sides of said first end.
6. The bedding structure of Claim 1, further comprising a cover surrounding said bedding underlay and said speakers.
7. The bedding structure of Claim 6, wherein at least one of said speakers is secured to said cover.
8. The bedding structure of Claim 6, wherein one or more oscillators are at least partially embedded within said cushioning material, at least one of said oscillators being secured to said cover.
9. The bedding structure of Claim 1, wherein said cushioning material is formed from insulation material.
10. The bedding structure of Claim 1, wherein at least one of said speakers is positioned within an open recess in said cushioning material.
11. The bedding structure of Claim 10, further comprising a cover surrounding said bedding underlay, wherein said speaker within said recess is secured to said cover.
12. The bedding structure of Claim 2, wherein at least one of said oscillators is positioned within an open recess in said cushioning material.
13. The bedding structure of Claim 12, further comprising a cover surrounding said bedding underlay, wherein said oscillator within said recess is secured to said cover.
14. The bedding structure of Claim 1, wherein at least one of said speakers is enclosed within a porous case positioned in a recess within said cushioning material.
15. A bedding underlay comprising:
  - a cushioning material having a first end and a second end;
  - one or more speakers attached to said cushioning material; and
  - one or more oscillators attached to said cushioning material.
16. The bedding underlay of Claim 15, wherein one or more of said speakers is positioned proximate each of two opposing sides of said first end.
17. The bedding underlay of Claim 15, wherein one or more of said oscillators is positioned proximate each of two opposing sides of said second end.
18. The bedding underlay of Claim 15, wherein said cushioning material is formed from insulation material.
19. The bedding underlay of Claim 15, wherein at least one of said speakers is provided within a case attached to said cushioning material.
20. The bedding underlay of Claim 15, wherein at least

a portion of at least one of said speakers is fixed within said cushioning material.

21. The bedding underlay of Claim 15, wherein at least a portion of at least one of said oscillators is fixed within said cushioning material. 5
22. The bedding underlay of Claim 15, wherein at least one of said speakers is positioned within a recess in said cushioning material. 10
23. The bedding underlay of Claim 22, wherein said recess is imbedded within said cushioning material.
24. The bedding underlay of Claim 15, wherein at least one of said oscillators is positioned within a recess in said cushioning material. 15
25. The bedding underlay of Claim 15, further comprising a cover surrounding said cushioning material. 20
26. The bedding underlay of Claim 25, wherein at least one of said speakers is attached to said cover.
27. The bedding underlay of Claim 25, wherein at least one of said oscillators is attached to said cover. 25
28. The bedding underlay of Claim 15, wherein at least one of said speakers is provided within a speaker case embedded within said cushioning material. 30
29. A bedding underlay comprising:
  - a cushioning material having a top surface and a bottom surface; 35
  - one or more speakers secured to said cushioning material and positioned between said top and bottom surfaces;
  - one or more oscillators secured to said cushioning material and positioned between said top and bottom surfaces; and 40
  - a cover surrounding said cushioning material.
30. The bedding underlay of Claim 29, wherein said speakers are housed within recesses in said cushioning material. 45
31. The bedding underlay of Claim 30, wherein said recesses are imbedded within said cushioning material. 50
32. The bedding underlay of Claim 31, wherein said recesses include porous casings surrounding said speakers. 55



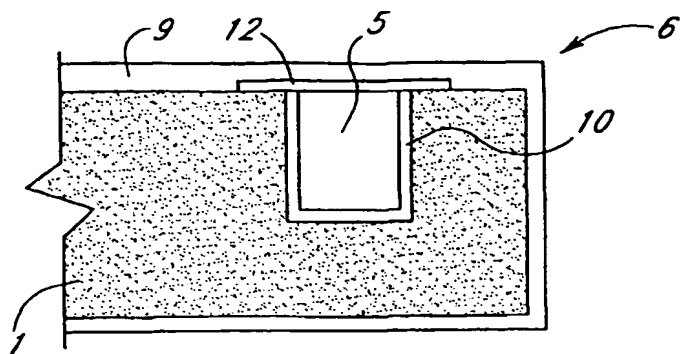


FIG. 6

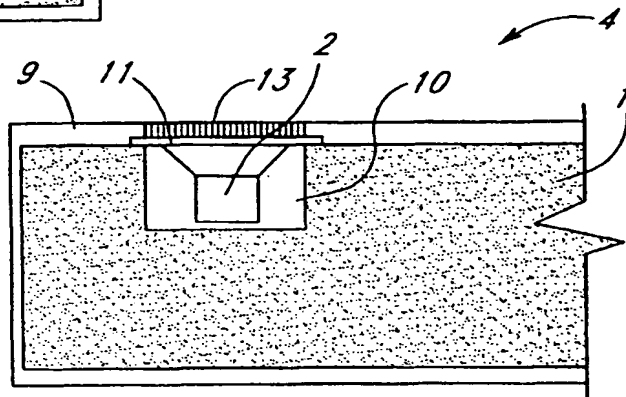


FIG. 8

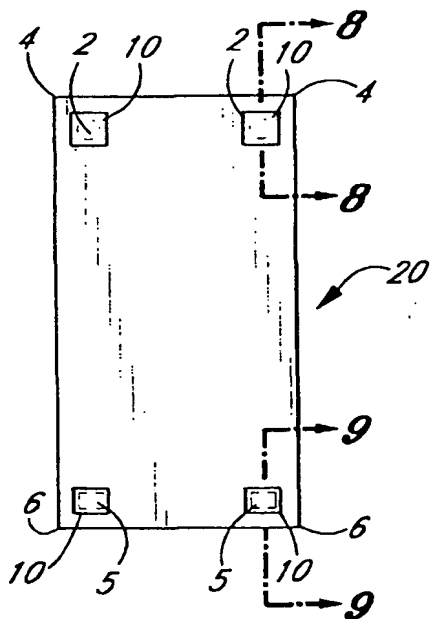


FIG. 7

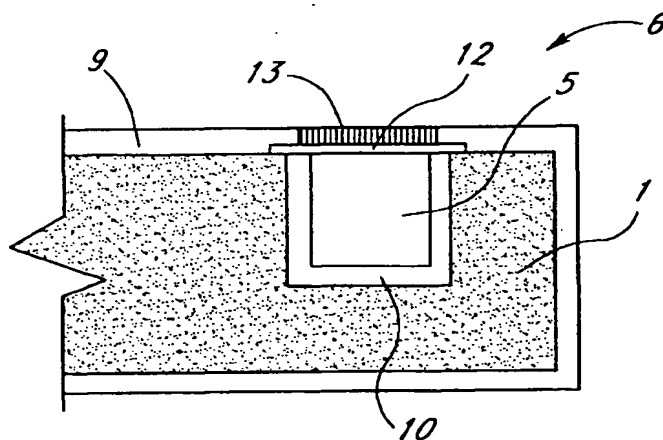


FIG. 9

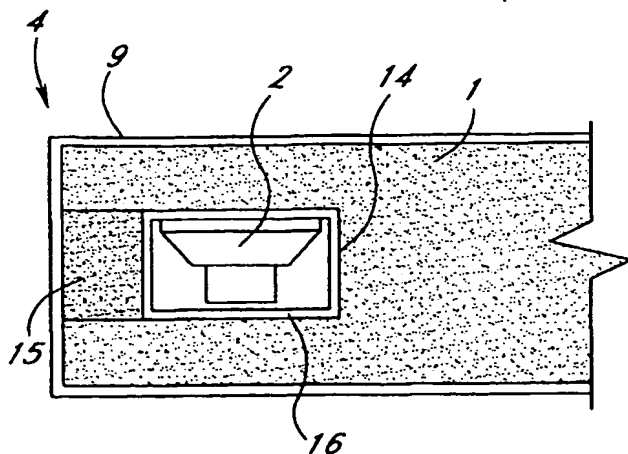


FIG. 10



European Patent  
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## EUROPEAN SEARCH REPORT

Application Number  
EP 99 11 7493

DOCUMENTS CONSIDERED TO BE RELEVANT			
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A	US 4 027 112 A (HEPPNER PAUL ET AL) 31 May 1977 (1977-05-31) * column 2, line 37 - column 60 * * column 3, line 37 - line 46 *	4,10,12, 22-24	
The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>20 December 1999</b>	Examiner <b>Joosting, T</b>
<p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : particularly relevant if taken alone  Y : particularly relevant if combined with another document of the same category  A : technological background  O : non-written disclosure  P : intermediate document</p> <p>T : theory or principle underlying the invention  E : earlier patent document, but published on, or after the filing date  D : document cited in the application  L : document cited for other reasons  &amp; : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03.82 (P/MC01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 99 11 7493

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
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